MARINE REVIEW.

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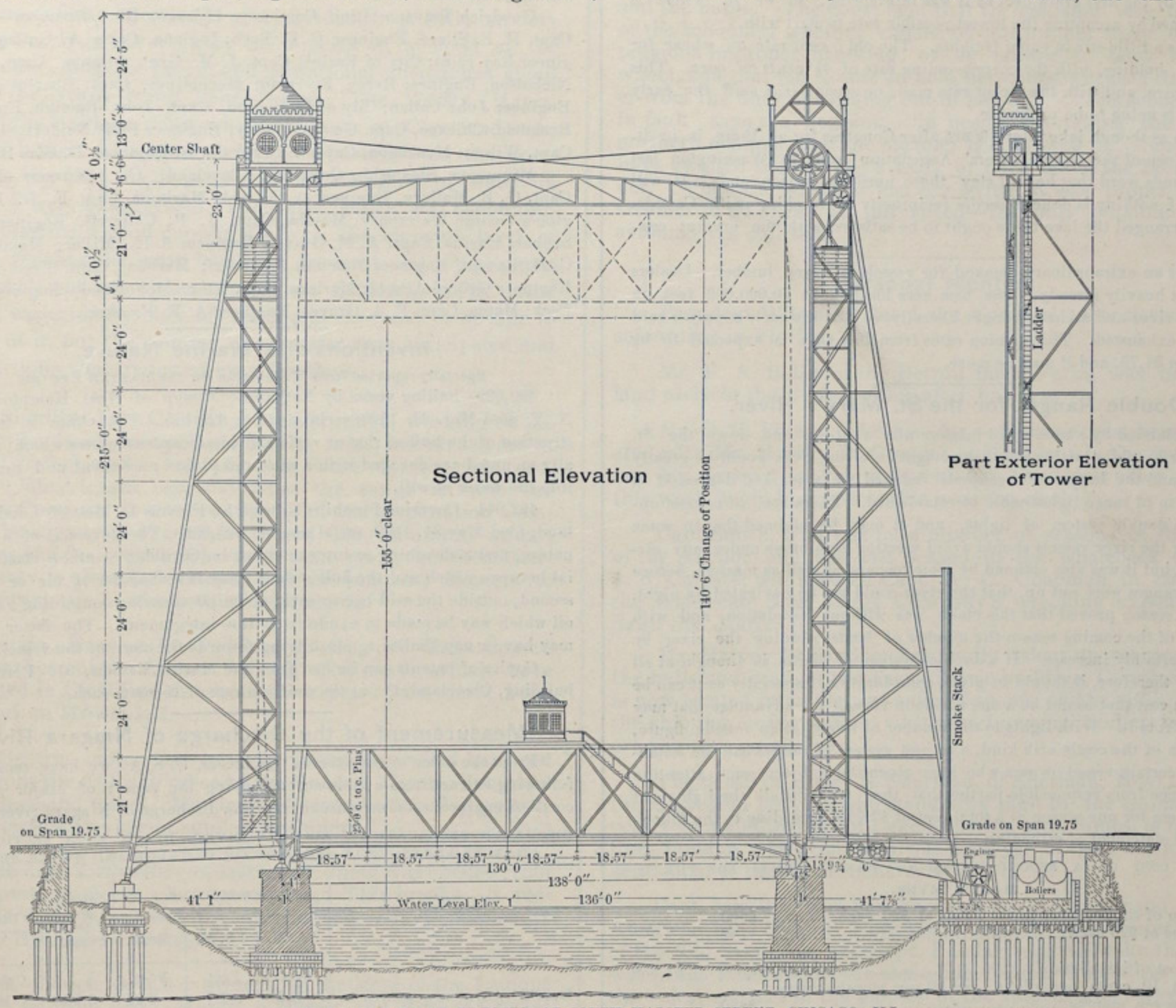
A Lift-Bridge at Chicago.

Chicago is to have a lift bridge over the south fork of the river at South Halsted street, where it was at first proposed to construct a bridge of the jack-knife kind. The lift bridge is entirely new to the lakes, and is novel in appearance and in its working system. The Chicago structure, upon which work is under way, will be built after the design submitted by J. A. L. Waddell, consulting bridge engineer of Kansas City, Mo., for a bridge over the ship-canal at Duluth, and the work of erecting it will be under the direction of Mr. Waddell. The contractors are the Pittsburgh Bridge Company.

As shown by the accompanying illustration, the bridge is designed to consist of a single truss span 130 feet long between centers of bearings, so supported and constructed as to allow of being raised vertically to a sufficient height to permit the largest lake vessels to pass unobstructed beneath. It crosses the river on a skew, the angle being about 67 degrees. On account of this skew, the clear width between lines drawn through the pier corners parallel to the river is reduced to about 90 feet. The distance from the surface of the water in the river at its ordinary stage to the lowest part of the bridge, when it is raised to its highest position, will be 155 feet, and the corrosponding distance for the lowest position of the structure will be about 14 feet. There will be two main piers, each 12x52 feet, under-coping, with an all around batter of one-half an inch to the foot and a footing course. These piers support the main columns of the towers with their load, and the live load of the span. At each side of the river there will be a strong, well braced tower, about 200 feet high above the water level, carrying at its top eight built steel and iron pulleys 12 feet in diameter, having 12-inch axles. Over these pulleys thirty-two steel wire ropes, of the greatest strength yet manufactured, 1½ inches in diameter, will pass. These ropes will be made into endless loops. One end of each of these loops will be attached to an end pin of the truss, and the other end to a rocker supporting one of the sets of counterweights, which counterweights will be so proportioned as to just balance the dead weight of the span. The weight of the cables is counterbalanced by that of cast iron chains, one end of each attached to the counterweights and the other end to the bridge. The attachment of these chains to the counterweights is made in such a way as to distribute equally the weight of the chains over the various cables, even if the latter stretch unequally.



LIFT BRIDGE TO BE ERECTED AT SOUTH HALSTED STREET, CHICAGO, ILL.

The power required to raise and lower the bridge will be supplied by two steam engines, either of which will suffice to operate the machinery. These engines will be located beneath the street on one of the approaches. The approximate weight to be lifted is 550,000 pounds, consequently that of the counterweights must also be 550,000 pounds. As the weight of the wire cables and the cast iron counterbalancing chains is about 40,000 pounds, the total mooving weight will be about 1,140,000 pounds.

Demurrage Cases—Freights on Hard Coal.

Special Correspondence to the MARINE REVIEW.

BUFFALO, N. Y., March 2—The demurrage cases were by no means settled by Judge Coxe's decision in the J. Emory Owen case. The New York Central Railroad, which owns the elevator against which the claims were made, is still coquetting with the owners of the steamer Wm. Edwards. When the descision was rendered it dropped down a peg in its offer of a settlement, but it is now coming up again, as the attorneys for the boat refuse to accept any reduction. The case is cited for the United States district court at Utica next week, though there is a strong probability of its being settled before that time. The case rests largely on the ability to prove that the road ran in some of its own vessels out of their turn and unloaded them while the Edwards was waiting. The old Chenango salvage case will also come up for argument at Utica. This is already a matter of ancient history, the boat having been known as the Lizzie Madden for some time.

There is some talk of coal freight rates. Vesselmen have made their demands informally for at least 60 cents to Chicago and coal shippers are thinking the matter over. They do not seem inclined to refuse the rate. As the opening rate last spring was 50 cents the extra demand and light tonnage seem to warrant at least that figure and the shippers know it. If the rate is to be smashed by the first grain fleet as it was last spring, so be it. There is nothing gained by accepting the lowest possible rate to start with.

There is a little stir in canal freights. The old 5 cent rate on wheat for the opening, holding, with the corresponding rate of 4⅝ cents on corn. This is a good figure, and with the 4-cent rate made on second trip stuff the early boat season is going to be profitable.

It looks as though lake interests are after Congress for all there is in it. Secretary Keep of the Lake Carriers' Association went to Washington last week and sends word that he will stay there until the season ends. It will be too bad if nothing is done to secure reciprocity of wrecking with Canada. With this arranged the lake trade ought to be satisfied with the present congress.

There is an extraordinary demand for vessels to carry lumber. Dealers have bought heavily already. One firm here has bought 70,000,000 feet on Menominee river and all have bought liberally, so that the early supply is said to be about exhausted. The opening rates from Bay City is expected to be not less than $1.75, and it may be more.

Double Ranges for the St. Mary's River.

It was claimed by a number of masters who went up and down the St. Mary's river by night last season that navigation of the river would be greatly facilitated, and the danger of accidents reduced in a marked degree, if a double system of range lights could be established. There are, of course, objections to a double system of lights, and it may be claimed that in some places along the river vessels should avoid meeting each other under any circumstances, but it was also claimed by some owners as well as masters, before the present ranges were put up, that the river could not be navigated by night. Results last season proved that this claim was without foundation, and with every week of the coming season the number of boats running the river by night will certainly increase. If a double system of lights is thought at all practicable, therefore, it should be given consideration, especially as it can be secured at a cost that would be a mere trifle in view of the advantage that may be derived from it. With lights to the number of thirty, at an outside figure, none of them of the costly crib kind, a second system of ranges can be established, and certain vessel owners who have given the subject some attention have assurance from responsible parties that they will install the lights and maintain them for one season at a total cost of $2,760, according to the following detailed statement of estimates:

ESTIMATED COST OF A SECOND SYSTEM OF RANGE LIGHTS FOR THE ST. MARY'S RIVER.

Construction of supports for thirty lights at $20 each	$600	
Thirty lamps at $25 each	750	
Total cost of installation	$1,350	$1,350
Oil, etc., at 10 cents per night, say $3 per month, thirty lights, seven months	$630	
Additional pay to nine keepers, say $10 per month each, seven months	630	
Total cost of maintenence one season	$1,260	$1,260
Installation and maintenance one season		$2,610
Possible cost of changing present ranges to suit double system		150
Total for all purposes		$2,760

The light-house board has promised to give special attention to the question of increasing facilities for the navigation of this river by night, and the low estimate of cost on the improvement here referred to should certainly warrant some attention from the officers of the service. The estimate for erecting poles on which to display the new lights is below the cost of the present supports for lights in use, but the work last season was done by the day, which in this case is more expensive than it would be under a contract.

Some Appointments of Officers.

Huron Barge Company, Cleveland, O.: Steamer—Pathfinder, Capt. W. B. McGregor, Engineer C. A. Heisner. Barge—Sagamore, Capt. John Weeks.

Brown & Co., Buffalo, N. Y.: Steamers—W. H. Barnum, Capt. G. W. Case; Samoa, Capt. W. W. Stewart; David Vance, Capt. John Mason; Sam Marshall, Capt. James T. Kenny. Schooners—A. C. Maxwell, Capt. Fred Norton; S. J. Tilden, Capt. John Rourke.

Detroit & Cleveland Steam Navigation Company, Detroit, Mich.: Steamers—City of Detroit, Capt. A. J. McKay, Engineer William Huff; City of Cleveland, Capt. Dougal McLachlan, Engineer John Sargent; City of Alpena, Capt. M. Lightbody, Engineer John Jones; City of Mackinac, Capt. Henry Slyfield, Engineer William McDonald; City of the Straits, Capt. Duncan McLachlan, Engineer James Middleton.

Lake Michigan and Lake Superior Transportation Company, Chicago, Ill.: Steamers—Manitou, Capt. Allan McIntyre, Engineer William Conley; Peerless, Capt. H. C. Page, Engineer William Lalande; City of Duluth, Capt. Donald McLean, Engineer Henry Chalk; City of Traverse, Capt. J. M. Twitchell, Engineer S. W. Armstrong; Jay Gould, Capt. James White, Engineer A. P. Williams; J. L. Hurd, Capt. L. Reynolds, Engineer D. Mac Manemy.

Goodrich Transportation Company, Chicago, Ill: Steamers—Virginia, Capt. H. E. Stines, Engineer G. P. Roth; Indiana, Capt. A. Gallagher, Engineer Ray Flint; City of Racine, Capt. J. M. Gee; Atlanta, Capt. William Nicholson, Engineer Byron Beerman; Menominee, Capt. Charles Kirtland, Engineer John Callan; City of Ludington, Capt. John Raleigh, Engineer J. Bushman; Chicago, Capt. George Wittey, Engineer Felix Neidert; Sheboygan, Capt. Wilson; Muskegon, Capt. Edward Carns, Engineer Thomas Dorey.

Minnesota Steamship Company, Cleveland, O.: Steamers—Mariposa, Capt. G. B. Mallory, Engineer A. Arnold; Maritana, Capt. F. D. Root, Engineer George Waterbury; Masaba, Capt. J. P. Cotterell, Engineer W. F. Sauber; Marina, Capt. A. M. Graves, Engineer S. H. Miller; Manola, Capt. C. H. Bassett, Engineer Malcolm Jamieson; Maruba, Capt. Fred Hoffman, Engineer George Arnold; Mariska, Capt. Alex. McFarland; Engineer R. L. Peck; Matoa, Capt. F. A. Graves, Engineer A. R. Brooker.

Inventions of a Marine Nature.

Specially reported from Washington for the MARINE REVIEW.

492,022—Sailing vessel by Nathan C. Jessup of West Hampton Beach, N. Y; filed Mar. 23, 1892; serial number 426,155. The claim is for a construction of the hull so that at various places boards or plates which are pivotally mounted are engaged with a rack and pinion movement and thus spread into the water at will.

492,044—Covering for ships bottoms by Francis D. Mott of London, England; filed May 31, 1892; serial number 435,056. The device is of a two-fold nature, first a sheathing or integument of india rubber or other elastic material between which and the hull proper there is a chamber of air or gas, and second, outside the said bag or sack, a similar covering containing a supply of oil which way be made to exude from the integument. The latter covering may have a nap similar to plush lying towards the stern of the vessel.

Copies of patents can be had from the Marine Review, 516 Perry Payne building, Cleveland, O., at the uniform rate of 15 cents each.

Measurement of the Discharge of Niagara River.

From the office of the chief of engineers, U. S. A., we have received the following extract from a table accompanying the report of Major Stickney, corps of engineers, on measurement of the discharge of Niagara river:

DISCHARGE OBSERVATIONS, NIAGARA RIVER, BLACK ROCK SECTION—DISCHARGES ARRANGED IN ORDER OF LOCAL GAUGE AND WATER AREAS.

DATE—1891.	BUFFALO GAUGE. 7 A. M.	BUFFALO GAUGE. 1 P. M.	BUFFALO GAUGE. Mean.	Mean Velocity per Second.	Mean Discharge per Second.
	Feet.	Feet.	Feet.		Cubic Feet.
Dec. 24	—3.2*	—2.7	—2.95	3.960	161,743
" 14	—1.8	—1.9	—1.85	4.573	192,802
" 21	—1.7	—1.8	—1.75	4.531	191,690
" 19	—1.7	—1.9	—1.80	4.598	195,166
" 11	—1.5	—1.6	—1.55	4.706	199,757
" 20	—1.8	—1.7	—1.75	4.700	199,751
" 28	—1.6	—1.6	—1.60	4.618	197,356
" 25	—1.6	—1.7	—1.65	4.615	197,291
" 22	—1.5	—1.4	—1.45	4.770	205,490
" 10	—0.4	—0.6	—0.60	5.105	221,862
" 12	—1.4	—1.0	—1 20†	5.111	222,813
" 16	—0.4	—0.2	—0.30	5.056	223,940

*Special observation at 9:30 a. m. Zero of Buffalo gauge is at mean level of Lake Erie—572.86 feet above mean tide at New York.

†Appears inconsistent; note velocity of wind.

Direction of river about N. 12° W., true bearing.

All observations taken with Price meter, No. 36. Observations began each day about 9 a. m. and closed at 1 p. m. Velocity observed each day at sixteen stations 100 feet apart.

Iron Mining.

VALUE OF LEADING STOCKS.

Quoted by Chas. H. Potter & Co., No. 104 Superior St. Cleveland, O.

Stocks.	Par Value.	Bid.	Asked.
Cleveland-Cliffs Iron Company	$100 00	$ 52 50	$.....
Champion Iron Company	25 00	.....	35 00
Chandler Iron Company	25 00	40 00	41 00
Jackson Iron Company	25 00	.....	75 00
Lake Superior Iron Company	25 00	27 00	.....
Minnesota Iron Company	100 00	65 00	66 00
Pittsburgh & Lake Angeline Iron Co.	25 00	.....	140 00
Republic Iron Company	25 00	.....	10 25
Ashland	25 00	.....	.....
Section Thirty-three	25 00	1 00	.....
Brotherton	25 00	.....	.....
Iron Belt	25 00	.....	2 00
Aurora	25 00	6 50	7 00

There is very little of interest to be said in mining shares, the market still ruling dull at low prices. No new dividends are heard of. The announcement some time ago that Lake Superior would probably pay $2 a share was unofficial, and there is as yet no definite knowledge of a dividend. A little anxiety was caused early in the week by the reports of a flood at the Ashland mine, Gogebic range, and sensational dispatches about danger of the Norrie being flooded also. The Messrs. Hayes, owners of the Ashland mine, who have been in Cleveland consulting with their sales agents relative to business for the coming season, say that the dispatches about the flow of water in their mines were exaggerated. The water, which was encountered while blasting a good deposit of ore on the eleventh level of the mine, reached the tenth level and drowned out a big pump on that level, but was under control on Saturday. The mine managers expected the flow of water and expected to be able to take care of it, but the volume was greater than anticipated and extra exertions were required for a few days.

The Sheridan Iron Company, Mesabi range, working on the Rouchleau lands adjoining the McKinley mine, has struck ore at a depth of 80 feet, and at last accounts were 15 feet into ore. One of the latest leases reported from the range is from the Shaw Iron Company to the Security Land and Exploration Company. The royalty is 30 cents a ton and the minimum output 50,000 tons the first year and 100,000 tons per year thereafter. The property is already developed and the company expects to begin shipping ore by the 20th of next month.

The main offices of the Penokee & Gogebic Consolidated Mines and those of the Aurora Mining Company, which have been located in Cleveland for about three years past, have been moved back to Milwaukee.

An electric motor for hauling cars underground has been ordered from the Chicago office of the General Electric Company for the Cleveland mine. Managers of several of the big properties contemplate the use of similar machinery.

In one day, Wednesday of last week, there was hoisted from the Minnesota property 3,821 tons of ore. This breaks all records for hard ore mines and it would indicate heavy shipments from Two Harbors next season.

Crerar, Clinch & Co., owners of the lease of the Lamont mine, are figuring with Messrs. Lindsay and Ross of Crystal Falls, Mich., for a lease of the Shafer mine, also of the Crystal Falls district.

Ponderous Boilers.

A question of big and heavy marine boilers is now exciting some attention on the Clyde. Messrs. Scott and Co., of Greenock, have lately fitted into four steamers, built by them for the Ocean Steamship Company of Liverpool, boilers weighing quite 90 tons each. But that weight has been considerably exceeded by the boilers of the Cunard liners Campania and Lucania. These boilers each weigh about 110 tons, and as there are a dozen for each ship, they collectively make an additional big item to the 9,000 tons which is said to be the launching weight of each vessel. Many of the steel plates used in the construction of these ponderous boilers weigh 7 tons, and the boilers in their finished state are the largest ever made in Great Britain.

Card-Iron Chief Collision Case.

The Federal Reporter, issue of Feb. 21, gives in full the descision of Judge Swan, of the United States district court Detroit, in the case of the Bradley estate of Cleveland, owning the schooner J. F. Card against the steamer Iron Chief of Detroit. In July 1891 the Card and the Iron Chief collided a short distance above Round island, head of St. Mary's river, at its junction with Waiska bay, and on the extreme northerly side of the channel. The statement of the case by the court and the decision are substantially as follows: The Card, bound down with a fresh northwest wind, having failed to obtain a tug to take her into the St Marys river, tacked across the broad southern channel and entered the narrow northern one, rarely used by sailing vessels. The steamer with the barge Iron Cliff in tow was at the same time passing up this channel on a course about northwest. The steamer, supposing the schooner was beating up the lake, stopped to let her pass the mouth of the channel, but when she put her helm up to enter it, started ahead, taking the northern side, in order to pass port to port. The schooner lost her swing, put her helm down, and collided with the steamer and the barge. The court held that the collision was the fault of the schooner, whether caused by putting her helm down, by previous improper handling, or by failure to obey her port wheel, and that her failure to hold her course excused the steamer from the duty of keeping out of her way. "The schooner was in fault" says the decision, "in needlessly taking the narrow northern channel after the steamer had entered it. She should have awaited the steamer's exit, or have taken the broad channel. When the schooner lost her swing, it was proper for the steamer to go ahead at full speed—the only possible way of avoiding the collision."

Personal Mention.

President Wilson of the Lake Carriers' Association is still sojourning in Florida.

Mr. F. A. Ballin of the Detroit Boat Works was in Cleveland early in the week looking after business.

Mr. O. C. Pinney, who has for some time past been associated with Mr. Harvey D. Goulder of Cleveland in the practice of law, has severed his relations with Mr. Goulder's office and will this week begin business on his own account.

Capt Smith, who was for a number of seasons in the boats of the Anchor line and last season in the whaleback steamer J. B. Colgate, will succeed Capt. A. C. Chapman, in charge of the American Steel Barge Company's wrecking expedition at Sault Ste. Marie.

Mr. Harvey D. Goulder has finally taken up company with the bulls and bears of the Perry-Payne building, Cleveland. He is now located in an elegant suite of rooms on the sixth floor of the shipping headquarters, with vessel owners, brokers and iron ore shippers on all sides.

The death of Henry S. Sherman, of Sherman, Hoyt & Dustin, Cleveland lawyers who stand very high in the estimation of vessel men and owners of Lake Superior iron mines, is reported from London. Mr. Sherman was a lawyer of rare ability and a gentleman of the highest character.

Capt. Jamison, who has been given the command of the American Line Steamer New York, was in the Westerland of of the Red Star Line, and Capt. Randal, who will take the Paris, was in the Friesland of the same line. Capt. Randal is one of the oldest masters in the employ of the International Navigation Company and was commodore of the Red Star line. He was one of the origonal American line captains.

President Harrison has appointed Judge Hanchett of Michigan to the judgeship in the United States circuit court, made vacant by the promotion of Judge Jackson to the supreme bench. Michigan senators are displeased because they were not consulted in the appointment, and the president's nomination has not as yet been considered by the Senate, but it will in all probability be sanctioned. This is the position for which lake shipping interests suggested the appointment of Mr. Harvey D. Goulder of Cleveland, but a cencerted effort to that end was not made.

An advertisement elsewhere is this issue calls for proposals on five lake light-ships, plans for which were printed in the last issue of the REVIEW.

Will the Classification Dues be Collected ?

It would seem from the action of the underwriters who met in Detroit Monday that it is still the intention to ask vessel owners to pay the classification dues of 1 cent a ton for wooden vessels and 1½ cents a ton for steel vessels, to be applied to the expense of publishing the Inland Lloyds Register. According to the dispatches, Messrs. Bradley, Millen and McVittie were elected to the board of officers having in charge the publication of the register. These gentlemen are representatives of the vessel owners selected at a meeting held in Cleveland several weeks ago, but none of them were present at the Detroit meeting, Monday. As the Cleveland meeting was attended by only a few local vessel owners, who had no authority to act for interests in all parts of the lakes, it was thought that the underwriters, who have gone ahead with the work of inspection, would get out the register as in previous years, when vessel owners had no part in its publication, but the Dctroit meeting would indicate that the owners will be asked to pay dues for inspection and classification.

Stocks of Grain.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store at the principal points of accumulation on the lakes on Feb. 25, 1893:

	Wheat, bu.	Corn, bu.
Chicrgo	14,537,000	6,658,000
Duluth	15,915,000	341,000
Milwaukee	2,021,000	14,000
Detroit	1,945,000	20,000
Toledo	3,634,000	1,462,000
Buffalo	2,693,000	85,000
Total	40,745,000	8,580,000

At the points named there is a net decrease for the week of 194,000 bushels of wheat and a net increase of 10,000 bushels of corn.

Duluth as a Lumber Distributing Point.

In an address delivered at a banquet given recently by the Jobbers' Union of Duluth, James J. Hill of the Great Northern Railway and Northern Steamship Company referred at some lengths the development of the railway and steamboat lines of which he is at the head, and the enormous growth of the grain business of the northwest. A most important feature of his address, however, was an outline of ideas as to the future of lumber business at the head of Lake Superior, in which lake vessel owners are very much interested. On this subject he said:

"I think I am substantially correct in saying that 10,000,000,000 feet is just about the annual cut of lumber in Michigan, Wisconsin and Minnesota, and that the entire state of Minnesota contains less than three years' supply of standing timber. At that rate that would be about 30,000,000,000 feet; that is, about three times the annual cut of the states just named. Now, what are you going to do when you have cut the trees that now stand? Every lumber man will bear me out in saying that, substantially, every tree is counted and every foot estimated. When this is gone and possibly before it is gone, you may hear from us away over the Pacific coast, bringing coals to Newcastle, bringing lumber to Duluth. Within the past fifteen months, along the line of our railway, along the shore of Puget sound, they have put up shingle mills that manufacture cedar shingles that are the best I have ever seen, and when they come in competition with your pine shingles, depend on it you will have to take second place. We have already sent them to New York and all along the Hudson, and the lumbermen of the Chippewa valley say they want to go there to locate, because they cannot compete with Puget sound shingles. In order to bring lumber from Puget sound and ship it by water, we have attempted a somewhat doubtful feat, but it is accomplished. We began last spring to haul lumber from Puget sound to the head of Lake Superior for 40 cents a hundred, or $8 a ton and if we should carry five per cent., say of the Pacific coast lumber, it would mean 500,000,000 feet a year, or 1,700,000 feet a day for 300 days in the year. It will be your fault if it is not done. There is no reason in the world why the lumber that is now handled at Tonawanda and Black Rock and all the distributing points of the lower lakes should not be distributed from Duluth. As I said before, the lumber that is standing in three states of Michigan, Wisconsin and Minnesota has all been counted, and it is only a question of a few years till you will have no lumber here. Then whence is the country going to draw its supply? The construction of the Panama canal is not going to help it. If that canal should be built tomorrow and pass vessels of every kind free, they cannot distribute lumber fifty miles inland from the Atlantic coast. Follow that lumber around to the Atlantic coast and see it landed and loaded on to the cars. The handling alone is a good deal of an item, to say nothing of time, interest and insurance. I am not any more afraid of the Panama canal than if it were built so shallow that it could only be used for lily pads. You should control the lumber traffic of this continent. If you control that, you control all other transportation. Every people who have controlled transportation have controlled the commerce of the world."

Around the Lakes.

During the past week the American Ship Masters' Association classified the American schooners Mary J. Cook, Hester A. Waters and Morancy, American barks Isaac Jackson and Mary Hasbrouck and the British schooner Trader.

Judge Jenkins of the United States district court, Milwaukee, has entered a decree of sale for the steamer J. G. Nichol to satisfy a claim of the First National Bank, of Menominee, Mich. The steamer will be sold at Sheboygan on March 9.

Recent sales of vessel property are: Schooner T. M. Knapp, Edward Knapp of Buffalo and Capt. August Jean of Bay City to Capt. John Powell, $9,000; Schooner Active, John Clansen of Milwaukee to E. Christianson of Manitowoc and E. H. Thorson of Milwaukee, $600.

In addition to the world's fair passanger steamer Christopher Columbus, eight whaleback vessels, all tow barges, are in various stages of construction at the West Superior ship yard. Two of them, the 126 and 128, have been launched and are about ready for service. All six of the tow barges on the stocks will be provided with gangways for the handling of flour.

Within the past few weeks fourteen big sreel steamers, of the fleet of forty or more laid up at Cleveland, have been docked in the big basin at the yard of the Ship Owners' Dry Dock Company, for examination and repairs. The list includes six of the nine Mutual and Menominee line boats, three of the Minnesota line, three of the Cleveland-Cliffs Mining Company's fleet and the Tuscarora and Pathfinder.

At the shipyard of the Detroit boat works a 36-foot steam launch and four electric launches will be built under a contract closed recently. These boats will be used by the officials of the world's fair, and the contract for them is additional to that made some time ago with the Electric Launch and Navigation Company for twenty-five electric launches, to be used in the canals and lagoons of the fair grounds. The steam launch is for the marine department.

Capt. Alexander McDougall was in Conneaut last week in consultation with the officials of the Pittsburg, Chenango & Lake Erie Railway, and it is evident that the projectors of this new ore and coal road are figuring to handle a large portion of the Mesabi ore to be carried to Lake Erie by the American Steel Barge Company. As soon as the weather will permit, government work to the extent of $40,000 will be done on the piers, and the dock company will add 1,700 feet to its present docks.

Another big steel steamer built by the Newport News Shipping and Dry Dock Company, the El Rio, left New York last week for New Orleans. The new ship has a length over all of 406 feet, a beam of 48 feet, and a depth of 33.9 feet. Her displacement is 4,500 tons. She is designed for a 16-knot speed. Her power consists of a triple expansion engine, having cylinders 32, 52 and 84 inches by 54 inches stroke. The working steam pressure will be 167 pounds. Steam will be generated by three double-ended Scotch boilers, having three furnaces at each end of the currugated type. She draws when light 18½ feet of water aft. Her maximum draft when loaded will be over 23 feet. The El Rio is only 27 feet shorter than the City of Peking of the Pacific Mail Line, which is reckoned to be the largest steamer under the American flag. In tonnage capacity the El Rio is nearly 1,000 tons ahead of the City of Peking. The new ship can carry 13,000 bales of cotton. A duplicate of this vessel named El Cid is now on the stocks at the Newport News yards.

Ore Sales—Lake Freights.

Although the market for pig iron has shown no advance in prices during the week, the feeling is still strong at the slight advance made in Bessemer a fortnight ago, and some of the makers of pig iron say that foundry iron is also in better demand. The improvement is not, however, important on the whole, and there is nothing in the situation to bring furnace men and iron ore dealers together on prices for the raw material. Vessel owners show no signs of anxiety and have not changed their ideas as to freights on next season's contract business.

The railways carrying coal to lake ports from the mines of Ohio and Pennsylvania have not as yet fixed freight rates, and until this question is settled there can be no general movement towards sales of soft coal. Three boats have been chartered for a first load to Milwaukee on the opening, and the rate, although not made public, is said to be 55 cents. It is expected that the rate on first loads of hard coal from Buffalo to Milwaukee will be 60 cents.

Society of Naval Architects and Marine Engineers.

Only an executive committee was elected at the recent meeting of this society in New York. Officers of the preliminary organization, whose names have all been given in previous reference to the society, were confirmed until the first general meeting, which will be held in New York about October. The executive committee as elected consists of Messrs Francis T. Bowles, H. T. Gause, Charles H. Loring, Louis Nixon and Harrington Putnam with the president and secretary-treasurer members ex-officio. Fees and dues are now being collected by this committee from about 425 applicants for membership, and further membership will be invited and accepted up to the date of actual incorporation, after which all applicants will be considered under the by-laws. Members and associates are invited by the executive committee to offer as early as possible any suggestions which may seem desirable in regard to the general meeting. Papers to be read should be forwarded to the committee by July 15. All communications should be addressed to W. L. Capps, secretary-treasurer, Society of Naval Architects and Marine Engineers, 1710 F Street, N. W., Washington, D. C.

He was Removed from the Service.

"A friend who wishes his name withheld has ordered this paper sent to you for three months." This is a sentence from a stereoyped letter received recently by vessel owners in different parts of the lakes. The paper is the Seaboard, an eastern publication, whose publishers, in an effort to wreak vengeance on the goveanment steamboat inspection service, have printed a great deal of matter tending to generally injure the reputation of lake ship builders. The articles and correspondence already published along this line are based upon a rehash of the unfortunate occurrances with steel steamers on the lakes last season, and in view of the evidence of their purpose, and the efforts of every body connected with the lake marine to take the fullest advantage of all that has been learned from these accidents, are entirely unworthy of being answered in any way. But the Seaboard is to be thrust upon lake vessel owners for three months by "a friend who wishes his name withheld." The friend may be mythical, and then again it may be that he does not wish to acknowledge his gift.

However this may be, it is certain that more of the rot that has been printed for some time past is to be inflicted in the future, and it may be as well to know that Alex. R. Smith of the seaboard was some time ago connected with the office of the local board of inspectors at New York in the capacity of stenographer, but was removed for the good of the service. Two months after the removal, Secretary Foster accepted his resignation, to date from the time of removal, withdrawing the letter of dismissal. Smith's revenge on the steamboat inspection service is therefore due to his forcible disconnection therewith. The loss of a $1,200 salary was that much loss as capital to the paper, in the publication of which Smith combined the position of stenographer and editor while in the New York inspectors' office. We can not claim perfection for the steamboat service, any more than several other marine branches of the treasury department, but there is little hope of reform through such a source.

The Steel Steamer Yuba.

Another big boat of the monitor type, the steel steamer Yuba, built for Capt. T. Wilson and others of Cleveland, was launched from the yard of the Cleveland Ship Building Company, Monday. This vessel might also be classed among the so-called "straight-backs," as she has no sheer at center of deck and only about 9 inches sheer at the deck at sides. Her midship section is easier than is common in lake steamers, and she has great "tumble home" on the top sides, which two features will tend to make her roll somewhat easier than vessels possessing a more box-like section. The principal dimensions are: Length over all, 338 feet; length of keel; 324 feet, or only 6 feet less than the keel of the Mariposa of the Minnesota fleet, one of the largest freight vessels afloat last season; beam, moulded, 42 feet; depth, moulded, 23¼ feet. She will have a dead weight ability at 16 feet mean draft of about 3,700 tons. The engines are triple expansion, with cylinders 20, 33 and 54 inches diameter and 40 inches stroke of piston. The boilers, two in number, are of the Scotch type, 12½ feet diameter by 12 feet long, and allowed a working pressure of 160 pounds. The wheel is 12½ feet diameter.

Features of the Yuma not altogether contained in the monitors Choctaw and Andaste, which were built by the same company and which went into commission last season, are mainly in the direction of additional structural strength. She has large box hold beams of double width about 22 feet apart, which are bracketed to the shell at the sides of the vessel, and extra deep web frames, which add greatly to her transverse section. Sheer strake and stringer plate are double and double strapped, and the hatches are only 26 feet wide, as against 29 or 30 feet in many other boats of the same dimensions. Both owners and builders have made every effort to have a very strong boat. While under construction the vessel has been inspected in all parts by Capt. F. D. Herriman, for classifisation by the Bureau Veritas of France as well as the Inland Lloyds, and Joseph R. Oldham of Cleveland was employed in representing the owners.

Death of Capt. Woods.

At a meeting of the Ship Masters' Association, Buffalo Lodge, No. 1, held Feb. 25, 1893, the following resolutions relative to the death of Capt. Woods, were adopted:

WHEREAS, It was with sentiments of sincere regret we learned of the death of Brother Patrick Woods of Oswego, N.Y.;

RESOLVED, That while we are profoundly conscious of the fact that the span of mortal life is controlled by an all-wise Providence, and we bow in humble submission to the Divine will, we yet sadly deplore the all-too-early death of our esteemed brother, and recognize the fact that our association has lost a most worthy and honorable member, his family a kind and loving protector, and the community, of which he was a valued member, one of its most estimable citizens.

RESOLVED, That we tender our heartfelt sympathy to the members of his bereaved family, and that these resolutions be spread upon the minutes of our last meeting and be printed in the MARINE REVIEW, and a copy forwarded to the family of the deceased.

JOHN N. DISSETTE,
EDWARD THORPE,
SAMUEL GOLDEN,
} Committee.

Steel plate entering into the construction of the steamer Centurion, illustrated in this issue, as well as material of the same kind being used in the two other big steel steamers building at the yard of the F. W. Wheeler & Co., West Bay City, is furnished by the Carbon Steel Company, through Condit, Fuller & Co., their Cleveland agents. The equipment of this company's steel plant is the finest in the country.

Subscribers will avoid danger of mistakes by giving the old as well as the new address when a change is desired.

MARINE REVIEW.

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

Chicago Office, Western Union Building, 110 LaSalle Street.
Published every Thursday at No. 516 Perry-Payne Building, Cleveland, O.

The books of the United States treasury department contain the names of 3,600 vessels, measuring 1,154,870.38 tons in the lake trade. In classification of this fleet the lakes have more steamboats of 1,000 to 2,500 tons than the combined ownership of this class of vessels in all other sections of the country. The number of vessels of 1,000 to 2,500 tons on the lakes on June 30, 1891, was 310 and their aggregate gross tonnage 512,-787.58; in all other parts of the country the number of this class of vessels was, on the same date, 213 and their gross tonnage 319,750.84. The classification of the entire lake fleet is as follows:

Class.	Number.	Tonnage.
Steam vessels	1,592	756,751.53
Sailing vessels	1,243	325,131.06
Canal boats	703	72,515.42
Barges	62	20,472.37
Total	3,600	1,154,870.38

Tonnage built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

	No. of boats.	Net Tonnage.
1887	152	56,488.32
1888	222	101,102.87
1889	225	107,080.30
1890	218	108,515.00
1891	204	111,856.45
Total	1,021	485,042.94

St. Mary's Falls and Suez canal traffic: Number of boats through St. Mary's Falls canal in 1890, 228 days of navigation, 10,557; tonnage, net registered, 8,454,435. Number of boats through Suez canal during 1890, full year, 3,389; tonnage, net registered, 6,890,014. Number of boats through St. Mary's Falls canal in 1891, 225 days of navigation, 10,191; tonnage, net registered, 8,400,685. Number of boats through Suez canal during 1891, full year, 4,207; tonnage, net registered, 8,698,777. Number of boats through St. Mary's Falls canal in 1892, 233 days of navigation, 12,580; tonnage, net registered, 10,647,203. Number of boats through Suez canal during 1892, full year, 3,559; tonnage, net registered, 7,712,028.

Entered at Cleveland Post Office as Second-class Mail Matter.

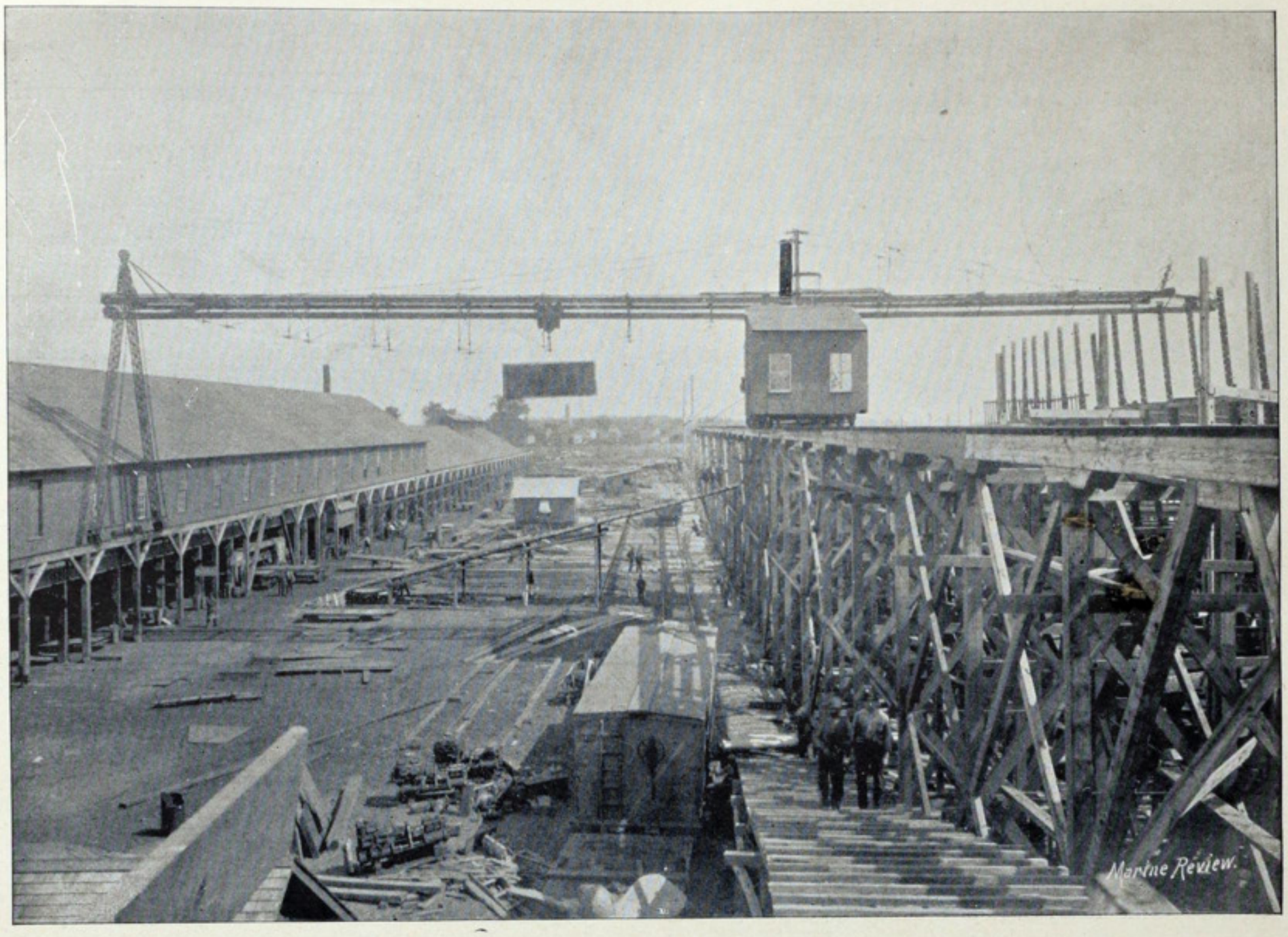
SECRERARY FOSTER of the treasury department has, to say the least, acted in a strange and hasty manner in ordering Gen. Dumont of the steamboat inspection service to instruct the New York inspectors to grant licenses to the foreign engineers of the American line steamers New York and Paris. He seems to defy the law as applied to thousands of similar cases in all time past, and the strangest part of the proceeding is his declaration that he is under no obligation to anyone to explain his rulings in the matter. Such was a part of the answer from the secretary received by President George Uhler of the Marine Engineers' Beneficial Association, who went to Washington immediately after it was learned in New York that the foreign engineers were in posession of licenses. In writing Mr. J. B. Wood, president of the Cleveland branch of the association, relative to his interview with Mr. Foster, Mr. Uhler adds that the secretary holds "that engineers are not, in the first place, officers according to his interpretation of the law, and that secondly the application for citizenship is sufficient to entitle and guarentee all the rights accorded those who may have served a regular probation." Mr. Wood, to whom president Uhler sends this information, was a member of a committee appointed by the national association at its last meeting in Chicago to visit Washington and look after the interests of American citizens with reference to the appointment of engineers for the New York and Paris. This committee had not anticipated any such extraordinary action on the part of Mr. Foster, and directed its attention simply to the question of defeating any bill that might be introduced to grant special licenses to the foreign engineers. It was found that such a bill would not stand a ghost of a chance in either houses in congress. But the end was accomplished through the secretary, and his order was as surprising as it was unjust. It will probably be necessary now to seek a settlement in the courts, but whatever the course of the engineers may be they should receive support from all officers of American ships. They should also have the support of vessel owners, who do not seem anxious, on the lakes at least, to draw upon foreigners for their ships' officers. This is a matter of the highest importance to captains and mates, as well as engineers, on the lakes, as the barrier once removed in the case of the engineer will act against other officers, and no where in this country has there been more annoyance from aliens in the merchant service than on the lakes. This action on the part of Secretary Foster is a direct slap at the principal of protection to American industry and American labor.

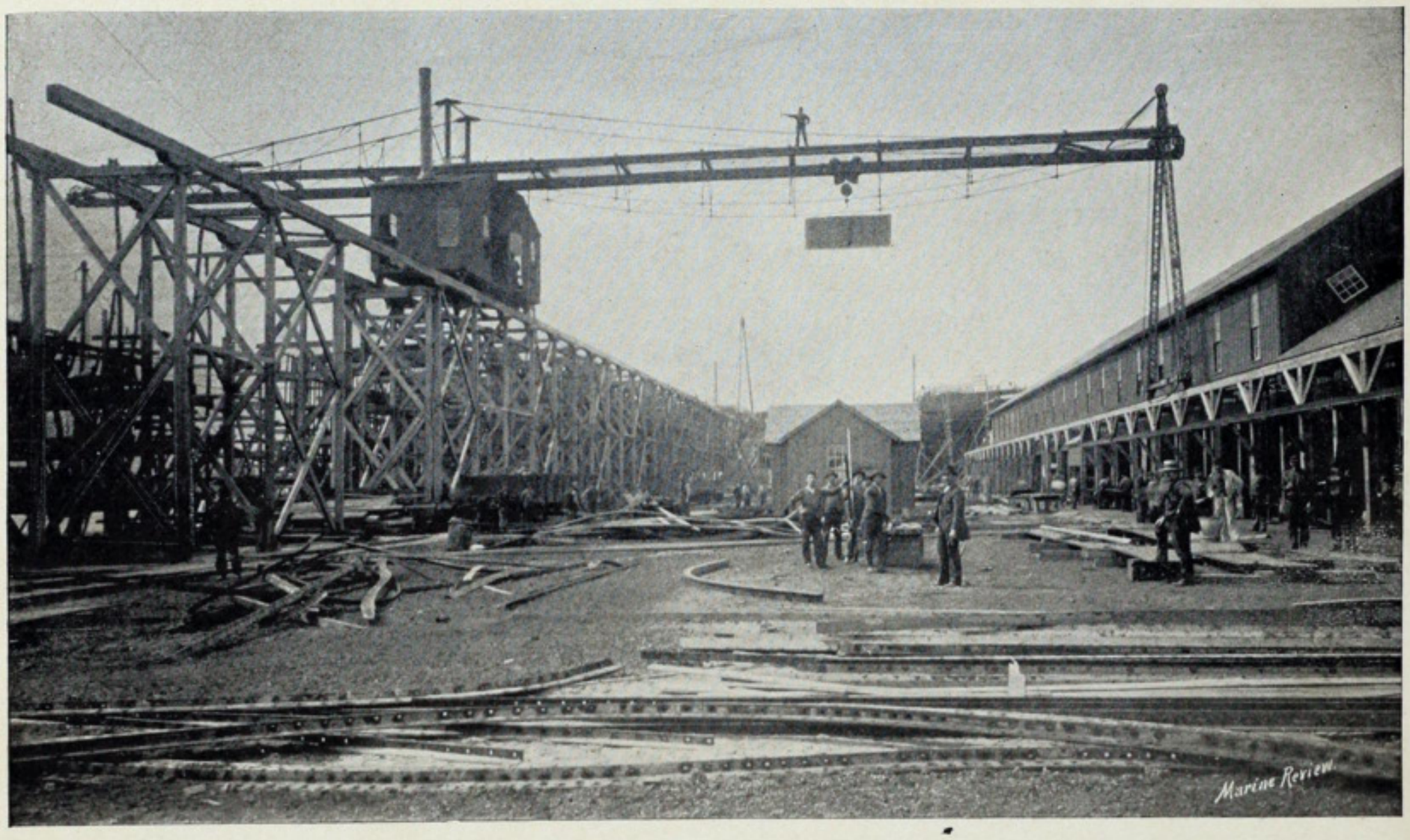
AS MIGHT be expected, Secretary Charles Foster of the treasury department, will in all probability retire with the outgoing administration without granting justice to Col. William Ludlow and Commander Heyerman in their case with the light-house board. The report of the army court of inquiry regarding Col. Ludlow's relations with the light-house board in this matter has been submitted to Secretary Elkins, but has not as yet been made public, and it is probable that the finding will not be known until after March 4, when a new secretary of the treasury will take office. Mr. Foster has not given proper recognition to the lake vessel owners who made plain to him the injustice done these officers. If he was so disposed he could certainly have received, before leaving office, a report of the finding of the army court in this case, and if Col. Ludlow was exonerated, he could have restored him to his position in the light-house service. The report of the army court was not necessary to such action, however, and as the secretary's actions from the beginning were obstinate and favorable to the executive officers of the light-house service, it could hardly be expected that he would change his position upon leaving the department.

THERE is still some fear that a strong effort will be made in the closing days of the present session of Congress to pass Senate bill 3,793, providing for the construction of a bridge for street railway purposes between Connor's and Rice's points, head of Lake Superior. Reports from the war department are against the measure, however, and representatives of the Lake Carriers' Association are watching it, on account of the danger of allowing any such bills to go through. If a bridge of any kind is to be constructed at this point, it should be so constructed as to include all traffic, as one obstruction in the channel for street car purposes would certainly be followed by others. But the vessel interests can not consistently sanction a bridge of any kind, in the light of the position which they have taken in such matters in the past. Following closely upon this bill, two others have been introduced in the House and Senate. They are duplicate measures, providing for the construction of a bridge across Calumet river, and will bear careful watching. The Senate bill is numbered 3,871 and the House bill 10,544.

A LETTER from the office of the chief of engineers, U. S. A., informs us that Col. O. M. Poe, Major C. E. L. B. Davis and Major C. B. Sears, all officers of the corps of engineers, are members of the board selected to investigate the subject of raft towing on the great lakes in accordance with Senator McMillan's joint resolution recently passed by Congress. The board will meet at Detroit on the call of the senior member, Col. O. M. Poe. These officers are especially fitted for this service, and it is more than probable that the vessel interests will give support in Congress to their report, which will have great influence in prompting the passage of a law regulating raft towing.

SENATOR MCMILLAN of Michigan has secured an amendment to the legislative appropriation bill striking out the three words "the Welland canal" from the act of May 24, 1890, providing for reciprocity in wrecking on the lakes. Vessel interests on this side care nothing for wrecking privileges in the Welland, and as this was the only objection raised by officials of the Canadian government to the act refered to, there should now be no delay in bringing about orders from both governments establishing reciprocity in this matter.





Two views of F. W. Wheeler & Co.'s Steel Ship Yard

The Brown traveling crane, which is used for handling plate, frames, etc., traverses the full length of the yard, 1,200 feet, the cantilever extension enabling the material to be placed in desired position on the vessel. It has a hoisting speed of 150 feet per minute, trolley speed of 500 feet per minute, and a track speed of 200 feet per minute.

F. W. Wheeler's No. 100—A Great Shipbuilding Record.

CENTURION is to be the name of the one hundredth vessel to be built at the yards of F. W. Wheeler & Co., West Bay City, Mich. The keel for this steel freight steamer was laid Thursday, which day, in addition to marking an epoch in the history of the yard, was also a day of special interest in the life of the builder, it being Mr. Wheeler's fortieth birthday. This will be surprising to his acquaintances in the lake business, and the building through single-handed effort and energy of one hundred vessels, most of them comprising the largest and best class of boats in the lake fleet, and eight of them being in sea-going service, is a surprising accomplishment.

The name is selected on account of the boat being No. 100 on the firm's books, and it is entirely appropriate, for in the days of the old Roman emperors the leader or commander of 100 men was designated as a centurion, only the best men gaining that command. Now, in the days of the building up of the lake marine, the builder of 100 boats gives that title to his one hundredth ship, on which no expense will be spared in order to have her command the admiration of hundreds of owners on the lakes.

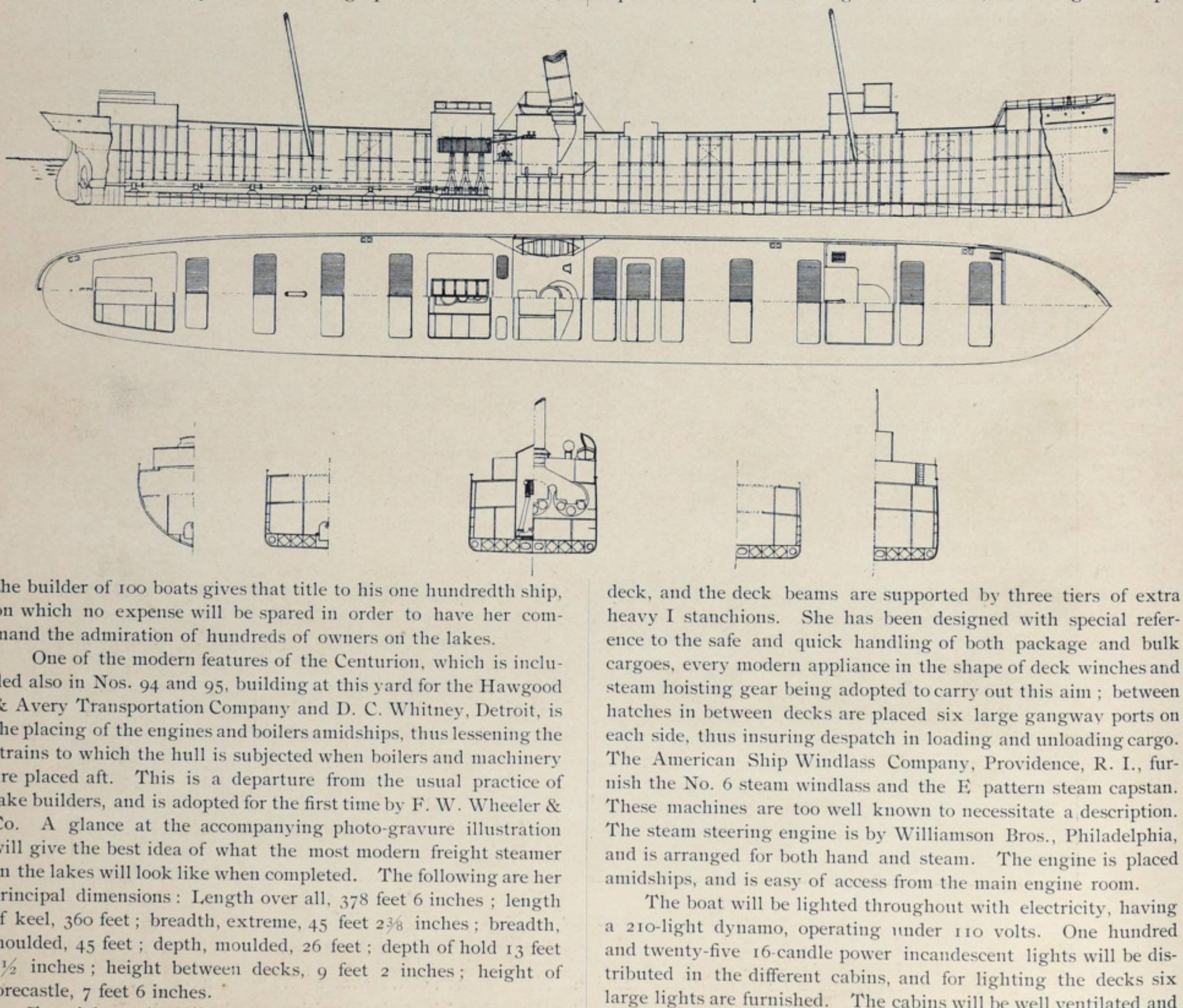
One of the modern features of the Centurion, which is included also in Nos. 94 and 95, building at this yard for the Hawgood & Avery Transportation Company and D. C. Whitney, Detroit, is the placing of the engines and boilers amidships, thus lessening the strains to which the hull is subjected when boilers and machinery are placed aft. This is a departure from the usual practice of lake builders, and is adopted for the first time by F. W. Wheeler & Co. A glance at the accompanying photo-gravure illustration will give the best idea of what the most modern freight steamer on the lakes will look like when completed. The following are her principal dimensions: Length over all, 378 feet 6 inches; length of keel, 360 feet; breadth, extreme, 45 feet 2⅜ inches; breadth, moulded, 45 feet; depth, moulded, 26 feet; depth of hold 13 feet 2½ inches; height between decks, 9 feet 2 inches; height of forecastle, 7 feet 6 inches.

Especial care has been taken in her scantlings to place her in the highest class obtainable both in the American Shipmasters' Association and the English Lloyds, the rules of which she exceeds in many cases. All the material used in her construction is tested to stand a tensile strength of 60,000 pounds, with an elongation of 25 per cent. in 8 inches, and is of the best open hearth steel.

Another feature is that the shell plating butts will be overlapped instead of butt strapped, and riveted throughout with three complete rows of rivets. In riveting, steel rivets will be used, which will give greater sheering strength. All stringers and longitudinal butts will be treble riveted throughout, and the spar deck stringer is double butt-strapped, especial care being taken to insure both in shell and longitudinal ties a clear shift of butts of from two to three frame spaces. Two 20-inch hold stringers aside run her entire length, and an extra one is fitted in the fore hold, which will extend through the collision bulkhead and will be connected to the panting stringer, which will prove a factor of safety in case of meeting heavy ice. Her forefoot will be cut away in ocean style to allow her to be quick on the helm.

The Centurion will be fitted with water ballast, having a cellular double bottom differing from the ordinary floor system employed in lake practice. The bottom will extend fore and aft, will be 54 inches deep, and will have a capacity of 1,600 tons, and there will also be a trimming tank aft. The sheer strake is extra heavy, and doubled for the entire length of the vessel. Web frames are spaced 16 feet apart throughout the vessel, extending to the spar deck, and the deck beams are supported by three tiers of extra heavy I stanchions. She has been designed with special reference to the safe and quick handling of both package and bulk cargoes, every modern appliance in the shape of deck winches and steam hoisting gear being adopted to carry out this aim; between hatches in between decks are placed six large gangway ports on each side, thus insuring despatch in loading and unloading cargo. The American Ship Windlass Company, Providence, R. I., furnish the No. 6 steam windlass and the E pattern steam capstan. These machines are too well known to necessitate a description. The steam steering engine is by Williamson Bros., Philadelphia, and is arranged for both hand and steam. The engine is placed amidships, and is easy of access from the main engine room.

The boat will be lighted throughout with electricity, having a 210-light dynamo, operating under 110 volts. One hundred and twenty-five 16-candle power incandescent lights will be distributed in the different cabins, and for lighting the decks six large lights are furnished. The cabins will be well ventilated and roomy, and elaborately finished in hard wood, the captain's and spare cabins being in the style of Louis XVI, making them equal



to the best passenger boats on fresh water. The rig will be a fore-and-aft schooner with two pole masts well raked, and standing gaffs. The pilot house and texas will be well aft, which will add to the appearance of the boat, making her more ocean-like than the usual lake style of steamer.

The Centurion's motive power will consist of a modern triple expansion engine, built by F. W. Wheeler & Co. in their own shops, with cylinders 23, 37½ and 63 inches, by 44 inches stroke, driving a Trout wheel of 13 feet 6 inches diameter. The cylinders are placed in the sequence of high, intermediate and low pressure. The valves are actuated by the ordinary Stephenson link motion. The high pressure and intermediate pressure cylinders have each a piston valve, and the low pressure cylinder has a double-ported balanced slide valve. The links are of the double barred type, and the motion is reversed by steam, the diameter of reversing cylinder being 12 inches. The bed plate is cast in one piece, and the frame work consists of three straight cast iron columns on the starboard side, and three Y-shaped columns on the port side, having very large bearing surfaces for the slides, and through bolts are used throughout. The cross heads and connecting rods are forged of the very best wrought iron. The piston rods are 5¾ inches diameter, of the very best machinery steel. The crank shaft is built up, and has a diameter of 12 inches, the cranks being set at an angle of 120 degrees. The thrust shaft has four large thrust collars, proportioned for a maximum thrust of 60 pounds per square inch. The intermediate shafting is 12 inches diameter and in 20 feet lengths, supported by six line shaft bearings. The stern tube is fitted with an internal lignum vitæ bearing, 5 feet long. The center of the engine is placed 132 feet from the after side of the stern post, and has a tunnel of ample size to allow free access to the whole length of shafting.

The condenser is independent, of Dean Bros.' type, the feed pump, duplex feed pump, bilge pump, cooler pump, deck pump and ballast pumps being supplied by the same company. The ballast pump has a capacity of 3,000 gallons per minute for emptying all the ballast tanks. Steam will be furnished by three cylindrical boilers of the return tubular type, 12 feet 6 inches diameter, and 12 feet 8 inches long, working at a pressure of 170 pounds. Each boiler has three 40-inch diameter furnaces, the total grate surface being 190 square feet, and the heating surface will be 6,500 square feet. The coal bunker capacity is 250 tons. A feed water heater of 24 inches diameter is fitted on the line of feed piping, containing 54 1½-inch brass tubes 8 feet long, and three double tube injectors are also fitted in addition to the feed pumps. The main steam pipe is provided with necessary slip joints, and is made of copper, carried below deck, as also are the receiver and exhaust pipes into condenser. The ship is to be heated with steam throughout.

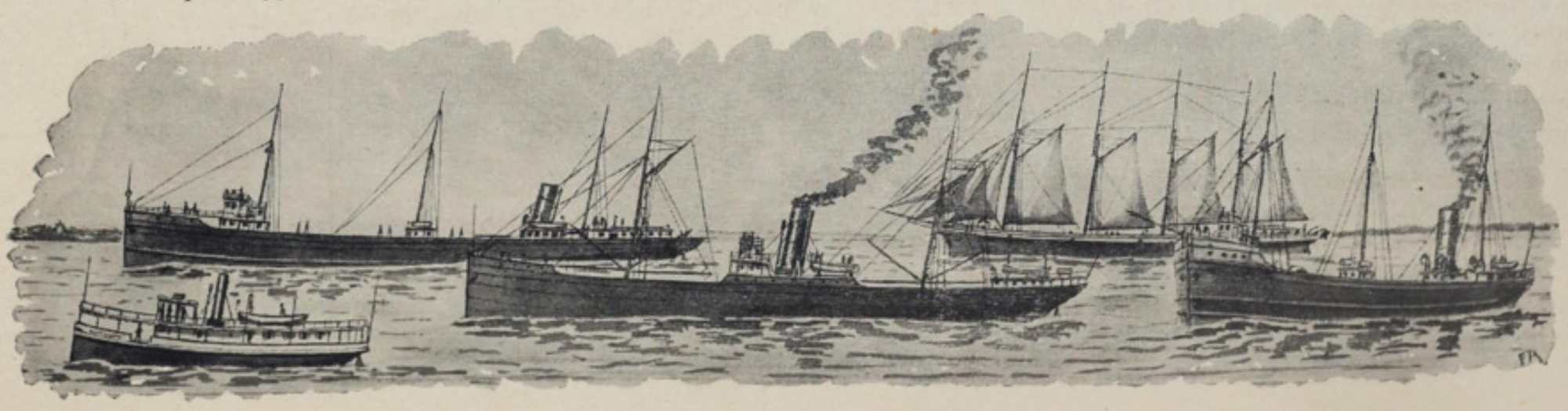
When 23 years old, Mr. Wheeler established a small repair yard at West Bay City, and during the first three years built six small vessels, in addition to doing considerable repair work. But in 1880 he commenced building large wooden steamers, and in that year turned out the Lycoming and Conemaugh. In 1889 the steel plant was established, and work was commenced on the steel hull side-wheel passenger steamer City of Chicago, and she was completed in June, 1890.

During the past summer the company acquired property and lengthened the steel plant 350 feet, so that a traveling crane now traverses the full length of the steel yard, 1,200 feet. The frontage of the wooden yard is 525 feet, but in this there are three 300-foot launching slips and space for keel blocks from which vessels may be launched endwise. The yard and working facilities are such that the largest steel or wooden steamer can be built within five months. An engine building works has been added to the plant recently, and the engines for the four government lightships and the tug Wilmot were built there, and at present there are five large triple expansion engines under construction for the steel steamers W. H. Gratwick, Centurion and the Hawgood & Avery Transit Company steamer, and for the wooden steamers for Hawgood & Canfield and M. A. Bradley, aggregating 7,000 horse power.

There are at present building and under construction at the plant of this company nine vessels and a tug, and 1,300 men are regularly employed. Four of these vessels are steel steamers, three being the largest freight steamers on the lakes. Two are wooden steamers, and the three schooners and the tug are also wooden. Not only has this yard the supremacy in the number of new vessels, but the aggregate value of the tonnage building is $1,500,000, which is greater than the value of vessels building in any other lake yard. The combined keel length of all the vessels in the yard is over one-half mile, and in going around three of the largest steel steamers one would cover a half mile. Two of the steel steamers are for the Hawgood & Avery Transit Company, Cleveland, and D. C Whitney, Detroit, and the third, the Centurion, is for the builder, but it is very probable that she will be sold before being launched. On 16 feet draft, these boats will carry 4,000 tons each, and they are valued at $270,000 each. The two wooden steamers for Hawgood & Canfield and M. A. Bradley, Cleveland, are 290 feet keel, 41 feet beam, and 23 feet deep, and 270 feet keel, 40 feet beam, and 22 feet deep, respectively. The three wooden schooners are for Colin McLachlan, of Detroit, Wm. Forbes, of Port Huron, Mich., and John Francombe, of Detroit, and their respective dimensions are: 250 feet keel, 41 feet beam and 18 feet deep; 270 feet keel, 41 feet beam and 20 feet deep; and 200 feet keel, 34 feet beam, and 14½ feet deep.

F. W. Wheeler & Co. were the first lake builders to make an effort to secure naval work, and but for the treaty of 1817 would have been awarded the contract for the practice vessel Bancroft, recently completed at Elizabethport, N. J. But treaties did not prevent them from building two first-class merchant freighters, the Mackinaw and Keeweenaw, cutting them in two, taking them through the Canadian canals and delivering them to the owners in New York. These boats are now in the very profitable trade of carrying coal from Seattle to San Francisco. This firm also built four steel lightships for the government, which are now on Atlantic coast service, and two tugs, one of which, the Yulu, is engaged in towing mahogany rafts in Central America, and the other is doing a general towing business at New Orleans.

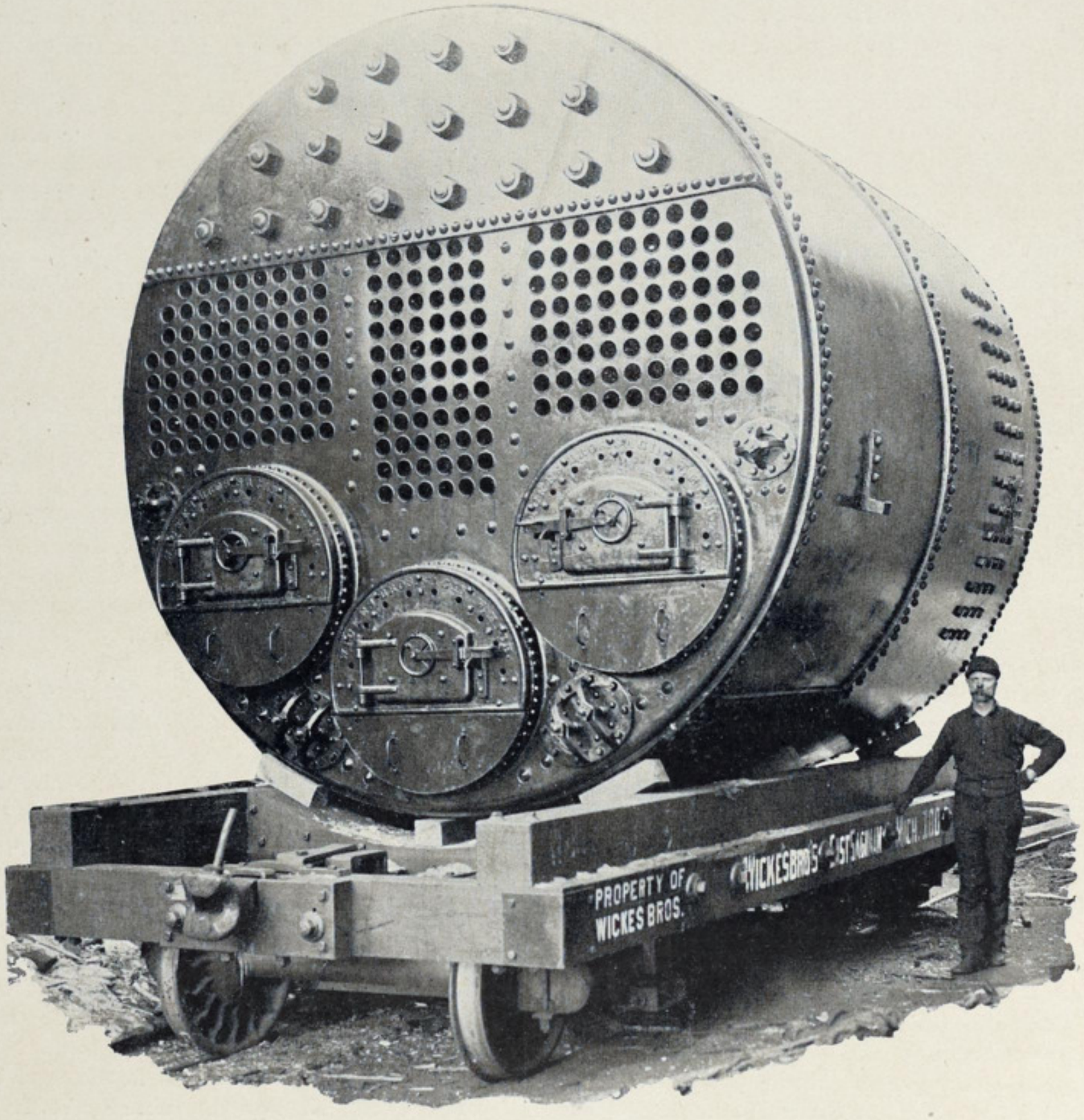
The greatest carriers and fastest steel boats built for lake service at the Wheeler yard were the W. H. Gilbert and Emily P. Weed. The Gilbert has a speed record of 14½ miles an hour loaded. The wooden steamers John Mitchell, Geo. F. Williams, Wm. F. Sauber and Ioseo are as profitable wooden carriers as are engaged in the lake carrying trade, and are claimed to be a trifle faster than those from other yards.



The Hundred Boats Built by F. W. Wheeler & Co.

Following is a list of the 100 vessels built by the Wheeler Company, all but three of which are still in commission. If placed end to end they would make a fleet nearly four miles long:

	KEEL LENGTH. FEET.
1877–81.	
1. Mary Martini	80
2. Luther Westover	100
3. Christie Forbes	70
4. Hannah B	100
5. Marion Teller	50
6. C. W. Liken	65
7. Lycoming	240
8. Conemaugh	240
9. Charles Cuyler	70
10. Maud S.	75
11. Saginaw Valley	150
12. Fred McBrier	160
1882.	
13. Galatea	175
14. Handy Boy	50
15. Osceola	182
1883.	
16. Kittie M. Forbes	195
17. Sarah M. Smith	75
1884.	
18. F. W. Wheeler (schr)	190
19. Alta	200
20. Tempest	40
21. Waldo A. Avery	245
1885.	
22. Thomas S. Christie	60
23. A. Folsom	180
24. B. W. Arnold	200
1886.	
25. H. A. Hawgood	230
26. Ossifrage	120
27. W. H. Stevens	212
28. W. R. Stafford	185
29. Mabel Wilson	240
1887.	
30. William H. Gratwick	256
31. F. W. Wheeler (str)	265
32. Sitka	272
33. Gogebic	275
34. Mecosta	280
35. Elfin Mere	187
1888.	
36. Tom Adams	280
37. Geo. Morley	187
38. Moravia	210
39. Robert L. Fryer	280
40. Soo City	170
41. Servia	240
42. Frank D. Ewen	200
43. Eber Ward	212
44. John V. Moran	212
1889.	
45. Geo. W. Roby	280
46. John M. Nicol	260
47. John Mitchell	281
48. Fedora	281
49. Newsboy	110
50. Monarch	95
51. Romeo	78
52. Juliet	78
53. John Plankinton	265
54. Plow Boy (1887)	80
55. Post Boy (1888)	90
56. Lulu Eddy (1888)	55
57. Fred B	57
58. Geo. F. Williams	280
59. Geo. Houghten	125
60. C. J. Fillmore	155
61. John A. Francombe	180
62. Dredge	—
1890.	
63. Nyanza	281
64. A. C. Tuxbury	180
65. C. E. Redfern	180
66. W. H. Sawyer	195
67. Edward Smith	195
68. City of Chicago	212
69. Emily P. Weed	300
70. Mackinaw	270
71. Newall A. Eddy	240
72. Olive Jeanette	240
73. Keweenaw	270
74. Tampa	290
75. C. H. Bradley	195
76. Michigan	295
77. F. & P. M. No. 5	210
1891.	
78. W. F. Sauber	291
79. Sailor Boy	91
80. Iosco	291
81. Mud Scow	—
82. Mud Scow	—
83. Yulu	126
1892.	
84. U. S. Lightship	111
85. U. S. Lightship	111
86. U. S. Lightship	111
87. U. S. Lightship	111
88. Uganda	291
89. W. H. Gilbert	328
90. J. C. Fitzpatrick	240
91. C. F. Bielman	291
92. W. G. Wilmot	106
ON STOCKS. NOT NAMED.	
1893.	
93. Steel, for Mitchell Steamship Co., (str.)	328
94. Steel, Hawgood & Avery Transit Co., (str.)	360
95. Steel, for D. C. Whitney, (str.)	360
96. Wood Schr., C. McLachlan et al	250
97. Wood Str. for Hawgood & Canfield et al	291
98. Wood Str. for Bradley Transportation Co	270
99. Wood Schr. for John A. Francombe et al	200
100. Steel Str., stock account, Centurion	360
101. Wood, Capt. Wm. Forbes et al., (schr.)	270
102. Wood, for W. H. Armstrong, (tug)	60



ONE OF THE CENTURION'S THREE BOILERS, BUILT BY WICKES BROS., E. SAGINAW, MICH. (For description see p. 13.

Development of the Marine Engine.

By Prof. R. H. Thurston.

[CONTINUED FORM LAST WEEK.]

The engine of the Clermont (Fig. 18) was of rather peculiar form, the engine being coupled to the crank shaft by a bell crank, and the paddle wheel shaft being separated from the crank shaft, but connected with the latter by gearing. The cylinders were 24 inches in diameter and of four feet stroke. The paddle wheels had buckets four feet long, with a dip of two feet.

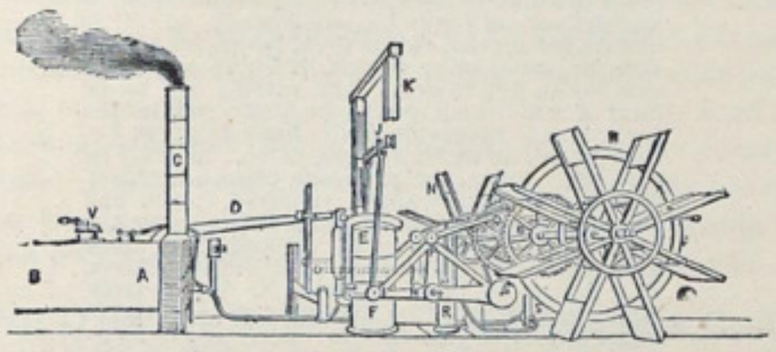


FIG. 18.—ENGINE OF THE CLERMONT, 1807.

Subsequently, Fulton built several steamers and ferry boats, to ply about the waters of the States of New York and Connecticut. The Clermont was a boat of but 160 tons burden; the Car of Neptune, built in 1807, was 295 tons; the Paragon, in 1811, measured 331; the Richmond, 1813, 370 tons; and the Fulton the First, built in 1814-15, measured 2475 tons. The latter vessel, whose size was simply enormous for that time, was what was then considered an exceedingly formidable steam battery, and was built for the United States navy. Before the completion of this vessel, Fulton died of disease resulting from exposure, February 25, 1815, and his death was mourned as a national calamity.

The prize gained by Fulton was, however, most closely contested by Colonel John Stevens of Hoboken, who has been already mentioned in connection with the early history of railroads, and who had been, since 1791, engaged in similar experiments. In 1789 he had petitioned the legislature of the state of New York for an act similar to that granted Livingston, and stated that his plans were complete and on paper.

In 1804, while Fulton was in Europe, Stevens had completed a steamboat 68 feet long and 14 feet beam, which combined novelties and merits of design in a manner that was the best possible evidence of remarkable inventive talent, as well as of the most perfect appreciation of the nature of the problem which he had proposed to himself to solve.

The engine (Fig. 20) was a direct-acting, high-pressure condensing engine of 10 inches diameter of cylender, 2 feet stroke of piston, and drove a screw of four blades, and of a form which, even to-day, appears quite good.

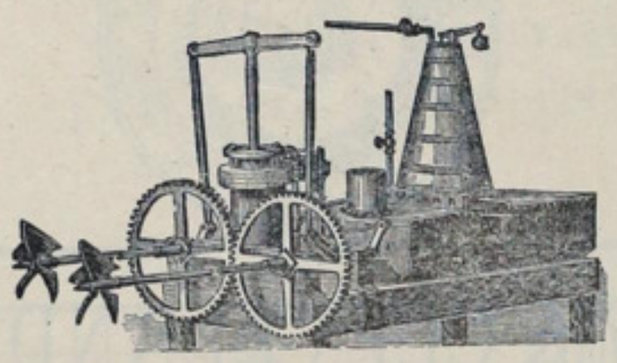


FIG. 20.—MACHINERY FOR TWIN-SCREW STEAMER OF 1804.

The first of Steven's boats performed so well that he immediately built another one, using the same engine as before, but employing a larger boiler; and propelling the vessel by twin screws (Fig. 21), the latter being another instance of his use of a device brought forward long afterward as new, and since frequently adopted. The boat was sufficiently successful to indicate the probability of making steam navigation a commercial success, and Stevens, assisted by his sons, built a boat which he named the Phœnix, and made the first trial trip in 1807, just too late to anticipate Fulton. The boat was driven by paddle wheels. The Phœnix, shut out of the waters of the state of New York by the monopoly held by Fulton and Livingston, was placed for a time on a route between Hoboken and New Brunswick; and then, anticipating a better pecuniary return, it was concluded to send her to Philadelphia to ply on the Deleware. At that time no canal afforded the opportunity to make an inland passage, and in June, 1808, Robert L. Stevens, a son of John, started with Capt. Bunker to make the passage by sea. Although meeting a gale of wind, he arrived at Philadelphia safely, having been the first to trust himself on the open sea in a vessel relying entirely upon steam-power. From this time for-

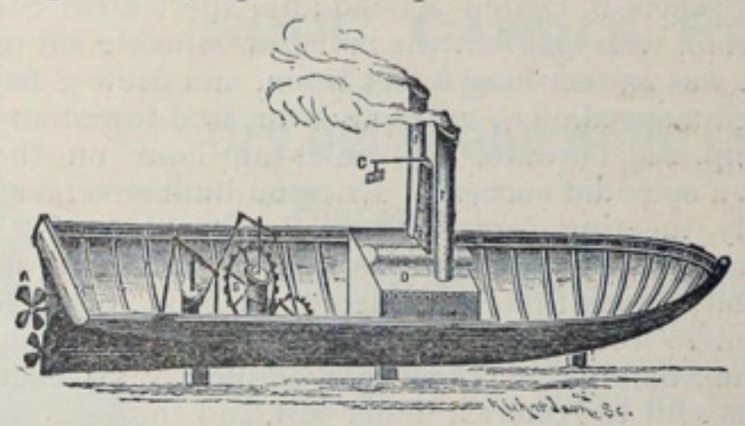


FIG. 21.—STEVENS' TWIN-SCREWS, 1805.

ward the Messrs. Stevens, father and sons, continued to construct steam-vessels.

The steam engine in most general use for sea-going ships when the introduction of the screw compelled its withdrawal, with the paddle-wheel which it drove, was that shown in Fig. 22, which represents the side-lever engine of the steamer Pacific, as designed by Charles W. Copeland. In the sketch, A is the steam-cylinder and B C the side-rods, or links, connecting the cross-head in the piston-rod with the end centre, D, of the side-lever D E F, which vibrates about the main centre E, like the over-head beams. A cross-tail at G is connected with the side-lever and with the connecting rod G H, which latter communicates motion to the crank I J, turning the main shaft J. The air pump and condenser are seen at O. M. The engine is one of the earliest and best examples of the type, and perhaps the first ever fitted with a framing of wrought iron.

After the experiments of Stevens, we find no evidencs of the use of the screw, although schemes were proposed and various forms were even patented, until about 1836. In that year, Francis P. Smith, an English farmer, who had become interested in the subject, experimented with a screw made of wood, and fitted in a boat built with funds furnished by a Mr. Wright, a London banker. He exhibited it on the Thames and on the Paddington canal, for several months. In February, 1837, by an accident, a part of the screw-blade was broken off, and the improved performance of the boat called attention to the advisability of determining its best proportions. In 1837, Smith exhibited his courage and his faith in the reliability of his little steamer, by making a coasting voyage in quite heavy weather, and the performance of his vessel was such as to fully justify the confidence felt in it by its designer. The British Admiralty soon had its attention called to the performance of this vessel, and to the very excellent results attained by the Archimedes, a vessel of 247 tons burden, which was built by Smith and his coadju-

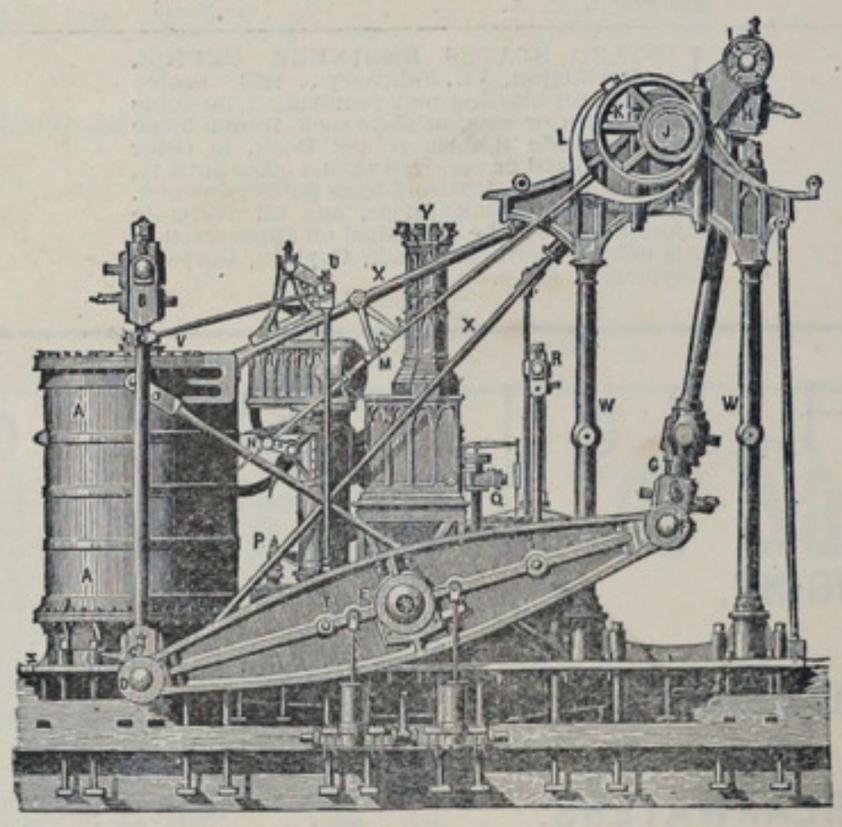


FIG. 22.—COPELAND'S SIDE-LEVER ENGINE, 1849.

tors in 1838 and tried in 1839, attaining a speed of 8 knots an hour. By the performance of the Archimedes, the advantages of screw-propulsion, especially for naval purposes, were rendered so evident that the British government built its first screw vessel, the Rattler, and Brunel adopted the screw in the iron steamer Great Britian, which had been designed originally as a paddle-steamer.

Simultaneously with Smith, Capt. John Ericsson was en-

gaged in the same project. He patented in July, 1836, a propeller which was found at the first trial to be of such good form and proportions as to give excellent results. His first vessel was the Francis B. Ogden, named after the United States consul at Liverpool, who had lent the inventor valuable aid in his work. The boat was 45 feet long 8 feet beam, and drew 3 feet of water. It attained a speed of 10 miles an hour, and towed an American packet-ship, the Toronto, 4½ miles an hour on the Thames. This was a splendid success. Ericsson built several screw-boats, and finally, meeting Capt. Robert F. Stockton of the United States navy, that gentleman was so fully convinced of the merits of Ericsson's plans that he ordered an iron vessel of 70 feet length and 10 feet beam, with engines of 50 horse-power. The trial of the Stockton in 1839 was eminently satisfactory. The vessel was sent to America under sail, and the designer was soon induced to follow her to this country, where his latter achievements are well known. The engines of the Stockton were direct-acting, the first examples of engines coupled directly to the crank-shaft, without intermediate gearing, that we met with after that of John Stevens. Soon after Ericsson arrived in the United States he obtained an opportunity to design a screw-steamer for the United States navy, the Princeton, and at about the same time the English and French governments had screw-steamers built from his plans, or from those of his agent in England, the Count de Posen. In these ships—the Omphion and the Pomona—the first horizontal, direct-acting engines ever built were used. They were fitted with double-acting air-pumps having canvas valves and other novel features.—From "A Manual of the Steam Engine," by Prof. R. H. Thurston; John Wiley & Sons, 53 E. Tenth Street, New York.

Destroyed by Fire.

A letter from New York informs us of the destruction by fire of the entire issue of Patterson's Nautical Dictionary, even to the binder's plates. Recognizing the merit of this work, the REVIEW contracted with the author some time ago for exclusive sale of it in the states of Ohio, Illinois, Michigan, Wisconsin and Minnesota. In securing this contract, it was necessary to take a large number of copies of the book, and we now have left the only considerable number of copies of the work in existence. For the present we will not take advantage of our good fortune, however, and the dictionary can still be had from us at $5.

UNITED STATES ENGINEERS OFFICE, Hickox Building, 185 Euclid Avenue, Cleveland, Ohio, February 26, 1893. Sealed proposals for dredging in Sandusky River, and at the harbors at Port Clinton, Huron and mouth of Black River, Ohio, will be received at this office until 2 o'clock, P. M., standard time, of Tuesday, March 28, 1893, and then publicly opened. Specifications, blank forms and all available information will be furnished on application to this office. JARED A. SMITH, Corps of Engineers, U. S. A. 2-9-16

UNITED STATES ENGINEER OFFICE, Burlington, Vt., February 7, 1893. Sealed proposals for blasting and removing 2,000 cubic yards, more or less, of slate rock, from a ledge near the State Reform School Dock, in Otter Creek, Vt., will be received at this office until 11, A. M., March 9th, 1893, and then publicyopened. Specifications, blank forms, and all available information will be furnished on application to this office. Smith S. Leach, Captain, Corps of Engineers. 8-15-1.

UNITED STATES ENGINEER OFFICE, Hickox Building, 185 Euclid Avenue, Cleveland, Ohio, February 26th, 1893. Sealed proposals for extension of piers, improving harbor at Huron, Ohio, will be received at this office until 2 o'clock, P. M., standard time, of Tuesday, March 28, 1893, and then publicly opened. Specifications, blank forms, and all available information will be furnished on application to this office. JARED A. SMITH, Corps of Engineers, U. S. A. 2-9-16

OFFICE OF THE LIGHT-HOUSE BOARD, Washington, D. C., February 24, 1893. Sealed proposals will be received at this office until 2 o'clock p. m. on Tuesday, the 14th day of March, 1893, for furnishing all the materials and labor of all kinds necessary for the construction and delivery of Light-Vessels Nos. 59, 60, 61, 62 and 63, for service on the great lakes, for a fixed sum or one or more vessels, or for an aggregate sum for all five vessels. The vessels are to be built of wood and are to be delivered to the Light-House Inspector at the Buoy Depot at Detroit Mich., or at St. Joseph, Mich., as may be directed. Forms of proposal, plans and specifications showing what is required, can be had or seen by applying to this office, or to the Light-House Inspectors at Portland, Me.; Boston, Mass., Tompkinsville, N. Y.; Philadelphia, Pa., Baltimore, Md., Buffalo, N. Y.; Detroit, Mich., or Chicago, Ill. The right is reserved to reject any or all bids and to waive any defects. JAMES A. GREER, Rear Admiral, U. S. N., Chairman. 2-9

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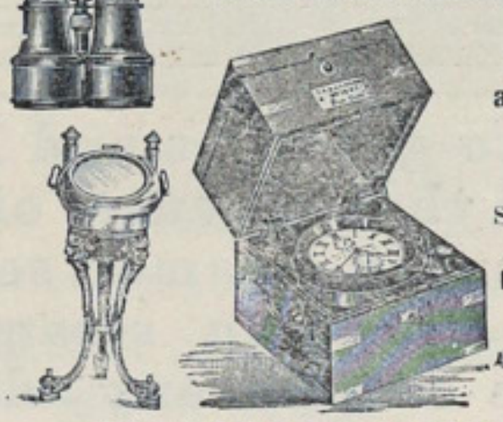

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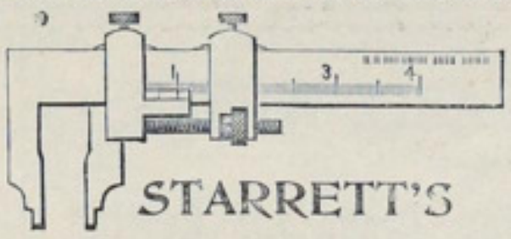

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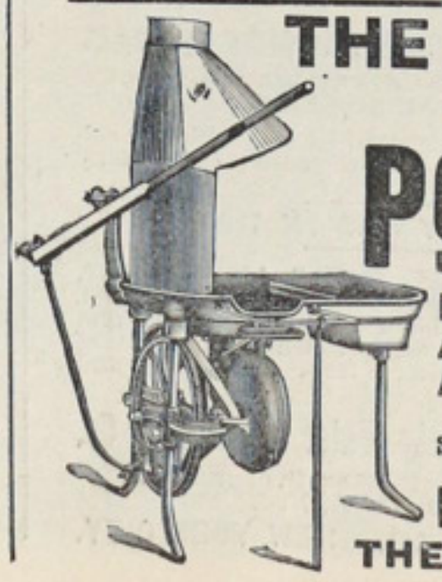

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